

**REMARKS****Summary of the Office Action**

Claims 1-3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Muramatsu (U.S. 2002/00220859 A1) (hereinafter "Muramatsu") in view Higashi et al. (U.S. Patent No.: 5,918,113) (hereinafter "Higashi") and further in view of Saito (JP 2003-124259) (hereinafter "Saito").

**Summary of the Response to the Office Action**

Applicants have amended claims 1 and 3 to differently describe embodiments of the disclosure of the instant application and/or to improve the form of the claims. Accordingly, claims 1-3 currently remain pending for consideration.

**Rejections under 35 U.S.C. §§ 103(a)**

Claims 1-3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Muramatsu in view of Higashi and further in view of Saito. Applicants have amended claims 1 and 3 to differently describe embodiments of the disclosure of the instant application and/or to improve the form of the claims. To the extent that these rejections might be deemed to still apply to the claims as newly-amended, they are respectfully traversed for at least the following reasons.

Applicants respectfully submit that Muramatsu discloses a semiconductor device comprising: a back-illuminated CCD (11) having a thinned portion (12); a substrate (28) bonded

to the CCD (11) by means of bumps (25); and a resin material (27) is disposed between said CCD (11) and the substrate (28).

Applicants respectfully submit that Higashi discloses a semiconductor device comprising: a semiconductor chip (30); electrode terminals (32) attached to the chip (30); a circuit board (10); a circuit pattern (12) formed on the circuit board (10); wherein said semiconductor chip (30) and the circuit board (10) are bonded via conductive particles (22) and the space between the semiconductor chip (30) and the circuit board (10) are filled with an Adhesive Conductive Film (resin) (20), wherein the periphery of the circuit board (10) is exposed from the resin (21).

Applicants respectfully submit that the Office Action's rejection was based on a technical misunderstanding of the applied Higashi reference. Particularly, although the Examiner stated in the Office Action, at item 6 on page 4, that "...a gap between the thinned portion..." Applicants respectfully submit that Higashi does not disclose the "thinned portion" to any extent. To the extent that such an assertion might be maintained, the Examiner is requested to specifically indicate in the next Office Communication where such a "thinned portion" is disclosed in Higashi.

Applicants respectfully submit that Saito discloses a seal material (30) in Fig. 4. The seal material (30) is used for bonding two glass plates (10, 20). Applicants respectfully submit that Saito also does not disclose a thinned portion. Note that reference numeral (32) formed at the seal material (30) indicates an injection gate for liquid crystal material. The injection gate is sealed by other material after the injection of the liquid crystal material in order to suppress the leakage of the liquid.

Accordingly, Applicants respectfully assert that the rejection under 35 U.S.C. § 103(a) should be withdrawn because Muramatsu, Higashi, and Saito, whether taken separately or combined, do not teach or suggest each feature of claims 1-3 of the instant application. As pointed out by MPEP § 2143.03, “[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.’ In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).”

Even further, Applicants traverse the Office Action’s combination rejection under 35 U.S.C. § 103(a) for the following additional reasons. Applicants respectfully submit that paragraph [0006] of the instant application’s specification describes the motivation of the disclosed invention as follows:

[0006] This invention was made in view of the above issue and an object thereof is to provide a semiconductor device, with which the distortion and cracking of a thinned portion of a semiconductor substrate are prevented to enable high precision focusing with respect to a photodetecting unit and uniformity and stability of high sensitivity of the photodetecting unit to be maintained (emphasis added).

Applicants respectfully submit that although Muramatsu discloses a “thinned portion,” the problem described in the above-underlined portion of paragraph [0006] of the specification of the instant application is not addressed or contemplated as is evident from a review of Muramatsu. In addition, Applicants respectfully submit that although Higashi discloses a resin sheet, Higashi does not disclose the “thinned portion.” In other words, Higashi merely shows the existence of a resin sheet. Even further, Applicants respectfully submit that Saito also does not show the thinned portion. Accordingly, Applicants respectfully submit that there is no

motivation disclosed in any of these references to combine the cited Higashi and Saito references with the cited Muramatsu reference.

Even further, Applicants respectfully submit that the advantageous combination of features described in independent claim 1 of the instant application includes a communicating portion (34, for example). Applicants note that the newly-added features to claim 1 in this regard are disclosed, for example, in connection with Fig. 2 of the instant application. Applicants respectfully submit that as shown in Fig. 2, the communicating portion (34) is formed so as to laterally penetrate through the resin sheet.

Accordingly, Applicants respectfully submit that even assuming, strictly arguendo, that one having ordinary skill in the art might be led to make the combination asserted by the Office Action, the communicating portion (34) could still not be derived from the combination. The thermally-expanded air escapes through the communicating portion (34) to suppress the distortion of the thinned portion (14), for example. Applicants refer to paragraphs [0021] and [0026] of the specification of the instant application in this regard for an explanation of an effect of the disclosed invention as follows:

**[0021]** The arrangement of resin 32 shall now be described in detail using Fig. 2. Fig. 2 is a plan view of wiring substrate 20 as viewed from its upper surface S4 side. In Fig. 2, broken lines L1 and L2 indicate outlines of semiconductor substrate 10 and thinned portion 14, respectively. The sectional view along line I-I of this figure corresponds to being Fig. 1. As shown in this figure, although resin 32 surrounds a periphery of a gap between thinned portion 14 of semiconductor substrate 10 and wiring substrate 20, it does not surround the entire periphery but surrounds the periphery with the exception of portions of the periphery. Specifically, resin 32 is disposed while leaving regions respectively extending from the four corners of a region of wiring substrate 20 that opposes the thinned portion (the rectangular region surrounded by broken lines L2) to the outer side of a region opposing semiconductor substrate 10. **Communicating portions 34 that put the gap between thinned portion 14 and wiring substrate 20 in communication with the exterior of semiconductor device 1 are thus defined**

at the gap between semiconductor substrate 10 and wiring substrate 20 (emphasis added).

[0026] A sealed space may form when the gap between thinned portion 14 and wiring substrate 20 is completely surrounded by the resin 32. In this case, **thinned portion 14 may become distorted due to expansion or contraction of the air** inside the sealed space during heating or cooling in the process of curing the resin, etc. In regard to this issue, with semiconductor device 1, the arrangement, wherein resin 32 surrounds the periphery of the gap except at portions of the periphery, is provided to prevent the gap from becoming sealed. Moreover, by use of the resin sheet formed in advance, this arrangement can also be realized readily and reliably (emphasis added).

Independent claim 3 has been amended to include similar features as discussed above with regard to newly-amended independent claim 1 of the instant application. Accordingly, similar arguments as set forth above with regard to newly-amended independent claim 1 of the instant application also apply to newly-amended independent claim 3 of the instant application.

Furthermore, Applicants respectfully assert that the dependent claims are allowable at least because of their dependence from independent claim 1, and the reasons discussed previously.

### **CONCLUSION**

In view of the foregoing, Applicants submit that the pending claims 1-3 are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution. A favorable action is awaited.

**EXCEPT** for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573.

This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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